FCC Test Report

Report No.:	RF171215C04G-1
FCC ID:	YZKECWO5211L
Test Model:	ECWO5213-L
Received Date:	Sep. 27, 2018
Test Date:	Oct. 12 ~ Oct. 27, 2018
Issued Date:	Nov. 09, 2018
Applicant:	Edgecore Networks Corporation
Address:	No.1, Creation 3rd Rd., Hsinchu Science Park, East Dist., Hsinchu City 30077, Taiwan, R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF171215C04G-1	Original release.	Nov. 09, 2018

1 Certificate of Conformity

Product:	CONCURRENT DUAL-BAND 11AC WAVE 2 AP
Brand:	Edgecore
Test Model:	ECWO5213-L
Sample Status:	Engineering sample
Applicant:	Edgecore Networks Corporation
Test Date:	Oct. 12 ~ Oct. 27, 2018
Standards:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Nov. 09, 2018

Suntee Liu / Specialist

Approved by : _____ , **Date:** Nov. 09, 2018

Bruce Chen / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -17.78dB at 0.15000MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.2dB at 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is IPEX not a standard connector.

*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOBE test plots were recorded in Annex A.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	200MHz ~1000MHz	3.86 dB
	1GHz ~ 18GHz	3.87 dB
Radiated Emissions above 1 GHz	18GHz ~ 40GHz	2.29 dB
	30MHz ~ 200MHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	CONCURRENT DUAL-BAND 11AC WAVE 2 AP
Brand	Edgecore
Test Model	ECWO5213-L
Sample Status	Engineering sample
Power Supply Rating	48Vdc (POE)
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	5180~5240MHz, 5745~5825MHz
Number of Channel	5180~5240MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5745~5825MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
Output Power	5180~5240MHz: Master Mode: 196.467mW Client Mode: 82.084mW 5745~5825MHz: 348.597mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	POE
Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of the original report no.: RF171215C04C-1. The differences compared with the original report are changing model and adding WLAN antenna.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS 0~8, Nss=1	2TX	2RX
	MCS 0~8, Nss=2	2TX	2RX
802.11ac (VHT40)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX
802.11ac (VHT80)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX

* The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

* The EUT supports Master mode and Client mode. For 5GHz band 1, Master mode and Client mode test results are presented individually. For the other band, Master mode and Client mode share common test results in test report.

3. There are WLAN, Bluetooth and GPS technology used for the EUT.
4. This device can support different category application which switched by access point mode and client mode by software.
5. The EUT contains certified BT-LE module which FCC ID: RC6-M2-TBT.
6. Simultaneously transmission condition.

Condition	**Technology**		
1	WLAN 2.4GHz	WLAN 5GHz	Bluetooth
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.			

7. The EUT must be supplied with a POE as following table:

No.	Brand	Model No.	Spec.
1	Powertron Electronics corp.	POE1024-480T3A050	AC Input: 100-240Vac, 1.0A, 50-60Hz DC Output: 48V, 0.5A

8. The antennas provided to the EUT, please refer to the following table:

Original antenna

For Model No.: API50c (Internal Patch antenna)				
2.4GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	2400	8.0	Patch	None
	2450	8.2		
	2500	8.0		
2	2400	8.3		
	2450	8.4		
	2500	7.8		
5GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	5150	7.0	Patch	None
	5500	6.8		
	5825	7.3		
2	5150	7.0		
	5500	6.7		
	5825	6.6		
For Model No.: API51c (External Dipole antenna)				
2.4GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	2400	4.87	Dipole	N-type
	2450	4.9		
	2500	4.92		
2	2400	4.87		
	2450	4.9		
	2500	4.92		

5GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	5150	6.87	Dipole	N-type
	5250	6.8		
	5350	6.76		
	5450	6.83		
	5550	6.85		
	5650	6.75		
	5750	6.92		
	5850	6.83		
2	5150	6.87		
	5250	6.8		
	5350	6.76		
	5450	6.83		
	5550	6.85		
	5650	6.75		
	5750	6.92		
	5850	6.83		

Bluetooth antenna spec.			
Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
2400	3.71	PIFA	None
2450	3.79		
2500	3.88		

GPS antenna spec.				
Frequency (MHz)	Peak Gain (dBiC)		Antenna Type	Connecter Type
	Horizontal	Vertical		
1575	2.8	3.8	PIFA	Mini PCI
1575.4	2.7	3.7		
1610	3.9	3.4		

Note: For Bluetooth antenna and GPS antenna, model No.: API50c is as same as API51c.

New antenna

2.4GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	2400~2500	10.9	PIFA	IPEX
2	2400~2500	11.4		

5GHz antenna spec.				
Antenna No.	Frequency (MHz)	Peak Gain (dBi)	Antenna Type	Connecter Type
1	5150~5825	10.5	PIFA	IPEX
2	5150~5825	10.2		

Note: Max. gain was selected for the final test.

9. The EUT will be installed at outdoor area, the highest antenna gains from the horizon above 30 degrees are as below, for more detail information please refer to antenna specification and user manual.

Antenna gain (dBi)	Antenna install degree
-1.95	
Due to device will restrict installation position as above photo, thus consider to above 30 degrees highest antenna gain are chosen from XZ and YZ Plane (antenna specification of -60~60 deg.).	

3.2 Description of Test Modes

5180~5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

5745~5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission APCM: Antenna Port Conducted Measurement

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)	Remark
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0	-
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	6.5	
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5	
	802.11ac (VHT80)		42	42	OFDM	29.3	
	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0	
	802.11n (HT20)		144 to 165	149, 157, 165	OFDM	6.5	
	802.11n (HT40)		142 to 159	151, 159	OFDM	13.5	
	802.11ac (VHT80)		138 to 155	155	OFDM	29.3	

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)	Remark
-	802.11a	5180-5240	36 to 48	149	OFDM	6.0	-
	802.11a	5745-5825	149 to 165		OFDM	6.5	

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)	Remark
-	802.11a	5180-5240	36 to 48	149	OFDM	6.0	-
	802.11a	5745-5825	149 to 165		OFDM	6.5	

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)	Remark
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0	-
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	6.5	
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5	
	802.11ac (VHT80)		42	42	OFDM	29.3	
	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0	
	802.11n (HT20)		144 to 165	149, 157, 165	OFDM	6.5	
	802.11n (HT40)		142 to 159	151, 159	OFDM	13.5	
	802.11ac (VHT80)		138 to 155	155	OFDM	29.3	

Test Condition:

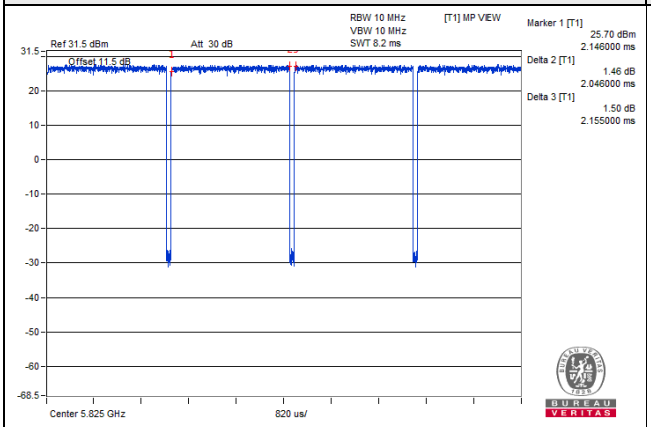
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	22 deg. C, 67% RH	120Vac, 60Hz	Adair Peng
RE<1G	24 deg. C, 66% RH	120Vac, 60Hz	Willy Cheng
PLC	22 deg. C, 61% RH	120Vac, 60Hz	Willy Cheng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Chris Lin

3.3 Duty Cycle of Test Signal

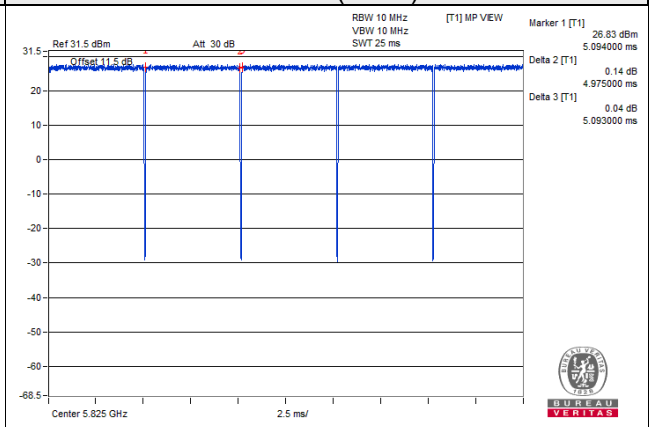
Duty cycle of test signal is < 98%, duty factor is required.

802.11a: Duty cycle = 2.046/2.155 = 0.949, Duty factor = 10 * log(1/0.949) = 0.23
802.11n (HT20): Duty cycle = 4.975/5.093 = 0.977, Duty factor = 10 * log(1/0.977) = 0.10
802.11n (HT40): Duty cycle = 2.415/2.513 = 0.961, Duty factor = 10 * log(1/0.961) = 0.17
802.11ac (VHT80): Duty cycle = 1.132/1.234 = 0.917, Duty factor = 10 * log(1/0.917) = 0.37

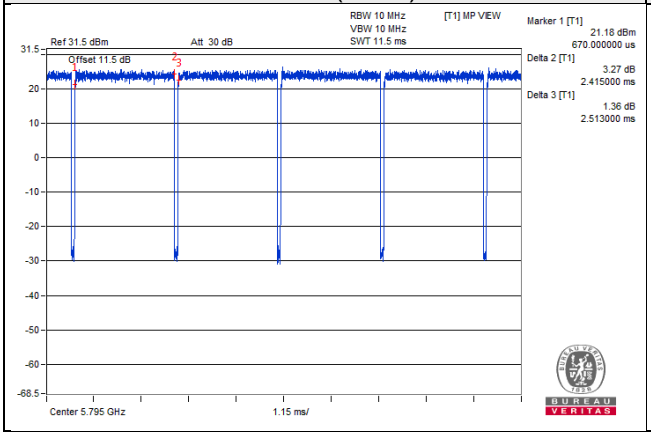
802.11a



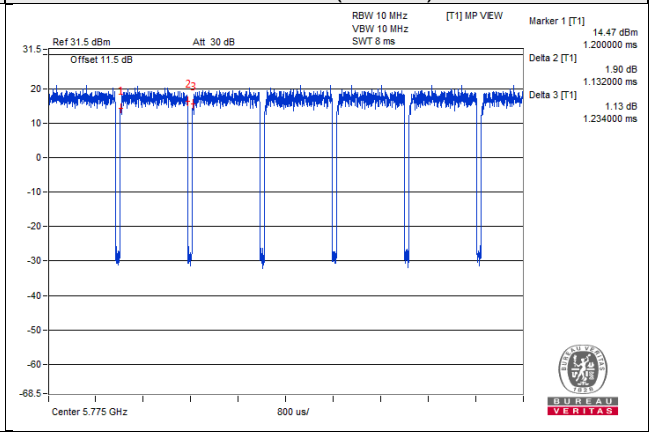
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

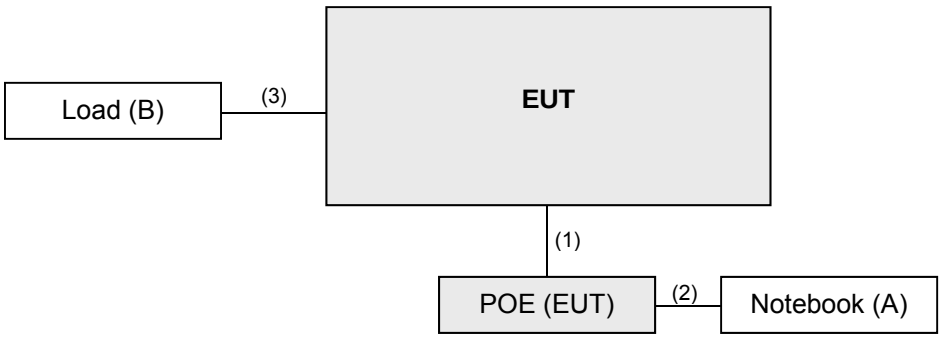
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	6	N	0	-
2.	RJ45, Cat5e	1	1.5	N	0	-
3.	RJ45, Cat5e	1	1.5	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)
KDB 789033 D02 General UNII Test Procedure New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10:2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

<table>
<tr><td colspan="3">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="3" rowspan="2">789033 D02 General UNII Test Procedure New Rules v02r01</td><td colspan="2">Field Strength at 3m</td></tr>
<tr><td>PK: 74 (dBμV/m)</td><td>AV: 54 (dBμV/m)</td></tr>
<tr><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK: -27 (dBm/MHz)</td><td rowspan="3">PK: 68.2(dBμV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☒</td><td>15.407(b)(4)(i)</td><td>PK: -27 (dBm/MHz) *1
PK: 10 (dBm/MHz) *2
PK: 15.6 (dBm/MHz) *3
PK: 27 (dBm/MHz) *4</td><td>PK: 68.2 (dBμV/m) *1
PK: 105.2 (dBμV/m) *2
PK: 110.8 (dBμV/m) *3
PK: 122.2 (dBμV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="5">*1 beyond 75 MHz or more above of the band edge.
*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.
*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\ \sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 29, 2018	May 28, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 12, 2017	Dec. 11, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	9120D	209	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2018	Aug. 20, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Apr. 03, 2018	Apr. 02, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Aug. 21, 2018	Aug. 20, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Nov. 14, 2017	Nov. 13, 2018
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5519 0004/MY55190007/MY 55210005	Jul. 17, 2018	Jul. 16, 2019

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

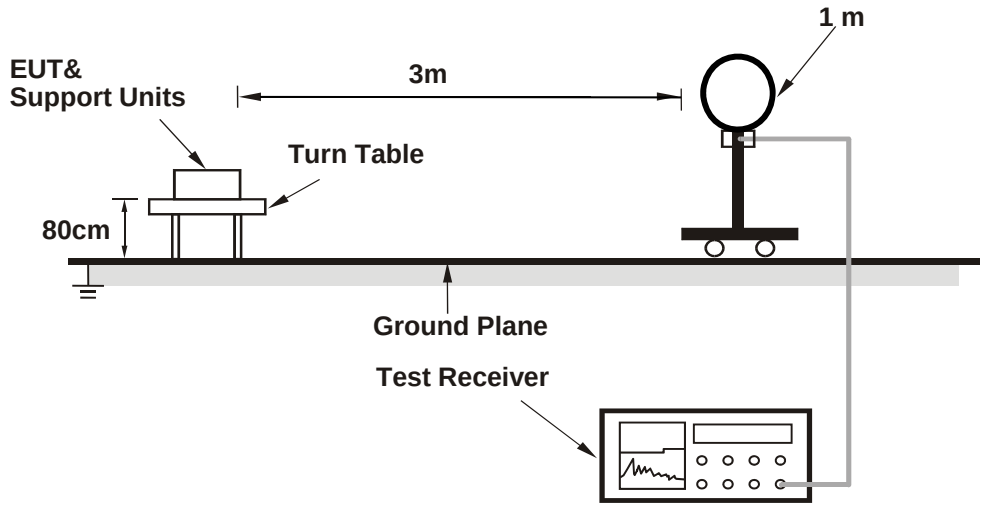
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

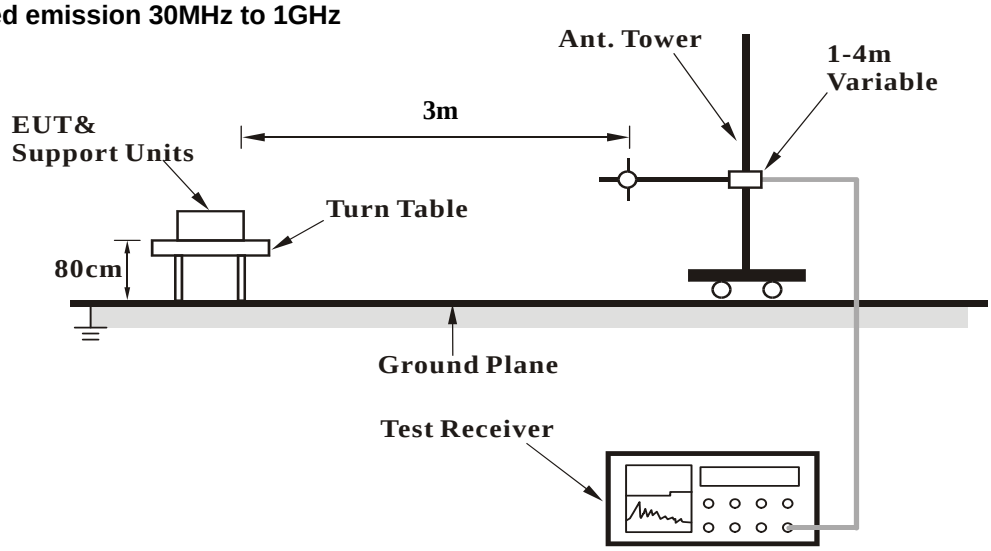
No deviation.

4.1.5 Test Setup

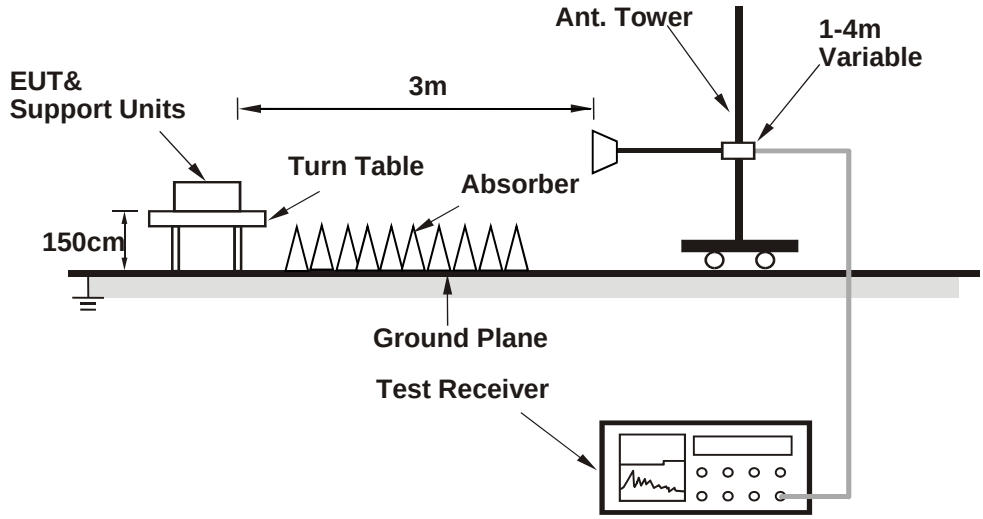
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz data:

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.8 PK	74.0	-7.2	2.08 H	349	56.6	10.2
2	5150.00	51.9 AV	54.0	-2.1	2.08 H	349	41.7	10.2
3	*5180.00	119.7 PK			1.96 H	351	80.5	39.2
4	*5180.00	107.9 AV			1.96 H	351	68.7	39.2
5	#10360.00	58.7 PK	68.2	-9.5	2.06 H	126	39.2	19.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.8 PK	74.0	-6.2	1.62 V	351	57.6	10.2
2	**5150.00**	**52.8 AV**	**54.0**	**-1.2**	**1.62 V**	**351**	**42.6**	**10.2**
3	*5180.00	119.9 PK			1.66 V	348	80.7	39.2
4	*5180.00	108.9 AV			1.66 V	348	69.7	39.2
5	#10360.00	59.2 PK	68.2	-9.0	1.77 V	150	39.7	19.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.1 PK	74.0	-4.9	2.11 H	352	58.9	10.2
2	5150.00	51.0 AV	54.0	-3.0	2.11 H	352	40.8	10.2
3	*5200.00	122.3 PK			2.19 H	343	83.0	39.3
4	*5200.00	110.4 AV			2.19 H	343	71.1	39.3
5	#10400.00	58.8 PK	68.2	-9.4	2.10 H	133	39.1	19.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.5 PK	74.0	-5.5	1.66 V	349	58.3	10.2
2	5150.00	51.5 AV	54.0	-2.5	1.66 V	349	41.3	10.2
3	*5200.00	122.0 PK			1.66 V	354	82.7	39.3
4	*5200.00	110.3 AV			1.66 V	354	71.0	39.3
5	#10400.00	59.0 PK	68.2	-9.2	1.80 V	151	39.3	19.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	121.9 PK			1.77 H	346	82.8	39.1
2	*5240.00	109.7 AV			1.77 H	346	70.6	39.1
3	5350.00	60.4 PK	74.0	-13.6	2.07 H	348	50.1	10.3
4	5350.00	47.6 AV	54.0	-6.4	2.07 H	348	37.3	10.3
5	#10480.00	59.5 PK	68.2	-8.7	2.11 H	144	39.3	20.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	122.0 PK			1.55 V	354	82.9	39.1
2	*5240.00	110.2 AV			1.55 V	354	71.1	39.1
3	5350.00	60.8 PK	74.0	-13.2	1.77 V	349	50.5	10.3
4	5350.00	48.4 AV	54.0	-5.6	1.77 V	349	38.1	10.3
5	#10480.00	59.7 PK	68.2	-8.5	1.81 V	149	39.5	20.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5614.10	61.8 PK	68.2	-6.4	1.50 H	345	57.6	4.2
2	*5745.00	124.2 PK			1.50 H	345	84.4	39.8
3	*5745.00	112.2 AV			1.50 H	345	72.4	39.8
4	#5934.62	61.0 PK	68.2	-7.2	1.50 H	345	56.2	4.8
5	11490.00	59.2 PK	74.0	-14.8	1.77 H	153	42.4	16.8
6	11490.00	45.7 AV	54.0	-8.3	1.77 H	153	28.9	16.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5616.67	59.0 PK	68.2	-9.2	1.63 V	350	54.8	4.2
2	*5745.00	123.2 PK			1.63 V	350	83.4	39.8
3	*5745.00	110.5 AV			1.63 V	350	70.7	39.8
4	#5969.23	58.9 PK	68.2	-9.3	1.63 V	350	54.0	4.9
5	11490.00	58.9 PK	74.0	-15.1	1.93 V	213	42.1	16.8
6	11490.00	45.4 AV	54.0	-8.6	1.93 V	213	28.6	16.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5612.82	61.7 PK	68.2	-6.5	1.50 H	340	57.5	4.2
2	*5785.00	124.4 PK			1.51 H	340	84.3	40.1
3	*5785.00	112.3 AV			1.51 H	340	72.2	40.1
4	#5949.36	59.1 PK	68.2	-9.1	1.50 H	340	54.3	4.8
5	11570.00	59.9 PK	74.0	-14.1	1.83 H	162	42.9	17.0
6	11570.00	46.2 AV	54.0	-7.8	1.83 H	162	29.2	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5635.26	58.0 PK	68.2	-10.2	1.65 V	355	53.8	4.2
2	*5785.00	123.5 PK			1.65 V	355	83.4	40.1
3	*5785.00	110.8 AV			1.65 V	355	70.7	40.1
4	#5957.05	57.9 PK	68.2	-10.3	1.65 V	355	53.1	4.8
5	11570.00	59.6 PK	74.0	-14.4	1.99 V	201	42.6	17.0
6	11570.00	45.8 AV	54.0	-8.2	1.99 V	201	28.8	17.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5642.95	61.5 PK	68.2	-6.7	1.47 H	338	57.2	4.3
2	*5825.00	124.8 PK			1.47 H	338	84.5	40.3
3	*5825.00	112.8 AV			1.47 H	338	72.5	40.3
4	#5927.56	60.6 PK	68.2	-7.6	1.47 H	338	55.7	4.9
5	11650.00	60.6 PK	74.0	-13.4	1.72 H	159	44.0	16.6
6	11650.00	47.0 AV	54.0	-7.0	1.72 H	159	30.4	16.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5611.54	58.4 PK	68.2	-9.8	1.62 V	354	54.2	4.2
2	*5825.00	124.1 PK			1.62 V	354	83.8	40.3
3	*5825.00	112.2 AV			1.62 V	354	71.9	40.3
4	#5949.36	59.0 PK	68.2	-9.2	1.62 V	354	54.2	4.8
5	11650.00	60.1 PK	74.0	-13.9	1.97 V	209	43.5	16.6
6	11650.00	46.3 AV	54.0	-7.7	1.97 V	209	29.7	16.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.5 PK	74.0	-7.5	2.01 H	349	56.3	10.2
2	5150.00	51.3 AV	54.0	-2.7	2.01 H	349	41.1	10.2
3	*5180.00	118.6 PK			2.07 H	351	79.4	39.2
4	*5180.00	106.9 AV			2.07 H	351	67.7	39.2
5	#10360.00	58.2 PK	68.2	-10.0	2.13 H	133	38.7	19.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.3 PK	74.0	-7.7	1.68 V	348	56.1	10.2
2	5150.00	52.4 AV	54.0	-1.6	1.68 V	348	42.2	10.2
3	*5180.00	119.2 PK			1.68 V	353	80.0	39.2
4	*5180.00	107.7 AV			1.68 V	353	68.5	39.2
5	#10360.00	58.7 PK	68.2	-9.5	1.73 V	139	39.2	19.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.7 PK	74.0	-5.3	2.10 H	349	58.5	10.2
2	5150.00	49.8 AV	54.0	-4.2	2.10 H	349	39.6	10.2
3	*5200.00	121.6 PK			1.85 H	348	82.3	39.3
4	*5200.00	110.3 AV			1.85 H	348	71.0	39.3
5	#10400.00	58.5 PK	68.2	-9.7	2.01 H	129	38.8	19.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.8 PK	74.0	-7.2	1.75 V	348	56.6	10.2
2	5150.00	50.9 AV	54.0	-3.1	1.75 V	348	40.7	10.2
3	*5200.00	120.3 PK			1.90 V	355	81.0	39.3
4	*5200.00	109.3 AV			1.90 V	355	70.0	39.3
5	#10400.00	58.6 PK	68.2	-9.6	1.83 V	152	38.9	19.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	120.7 PK			1.98 H	349	81.6	39.1
2	*5240.00	109.4 AV			1.98 H	349	70.3	39.1
3	5350.00	60.2 PK	74.0	-13.8	2.01 H	347	49.9	10.3
4	5350.00	49.3 AV	54.0	-4.7	2.01 H	347	39.0	10.3
5	#10480.00	59.3 PK	68.2	-8.9	2.01 H	137	39.1	20.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	120.6 PK			1.55 V	353	81.5	39.1
2	*5240.00	109.8 AV			1.55 V	353	70.7	39.1
3	5350.00	58.6 PK	74.0	-15.4	1.83 V	351	48.3	10.3
4	5350.00	49.3 AV	54.0	-4.7	1.83 V	351	39.0	10.3
5	#10480.00	59.2 PK	68.2	-9.0	1.73 V	155	39.0	20.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5617.95	61.6 PK	68.2	-6.6	1.59 H	343	57.4	4.2
2	*5745.00	123.3 PK			1.59 H	343	83.5	39.8
3	*5745.00	110.7 AV			1.59 H	343	70.9	39.8
4	#5946.79	59.0 PK	68.2	-9.2	1.59 H	343	54.2	4.8
5	11490.00	58.9 PK	74.0	-15.1	1.63 H	167	42.1	16.8
6	11490.00	45.7 AV	54.0	-8.3	1.63 H	167	28.9	16.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5633.97	58.4 PK	68.2	-9.8	1.58 V	347	54.2	4.2
2	*5745.00	121.6 PK			1.58 V	347	81.8	39.8
3	*5745.00	109.6 AV			1.58 V	347	69.8	39.8
4	#5980.13	58.9 PK	68.2	-9.3	1.58 V	347	53.9	5.0
5	11490.00	58.6 PK	74.0	-15.4	1.99 V	197	41.8	16.8
6	11490.00	45.4 AV	54.0	-8.6	1.99 V	197	28.6	16.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5632.05	59.3 PK	68.2	-8.9	1.49 H	340	55.1	4.2
2	*5785.00	123.8 PK			1.49 H	340	83.7	40.1
3	*5785.00	111.1 AV			1.49 H	340	71.0	40.1
4	#5955.13	59.0 PK	68.2	-9.2	1.49 H	340	54.2	4.8
5	11570.00	60.6 PK	74.0	-13.4	1.79 H	163	43.6	17.0
6	11570.00	46.3 AV	54.0	-7.7	1.79 H	163	29.3	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5603.85	57.1 PK	68.2	-11.1	1.70 V	353	52.9	4.2
2	*5785.00	122.4 PK			1.70 V	353	82.3	40.1
3	*5785.00	109.9 AV			1.70 V	353	69.8	40.1
4	#5976.92	59.1 PK	68.2	-9.1	1.70 V	353	54.1	5.0
5	11570.00	60.2 PK	74.0	-13.8	2.05 V	202	43.2	17.0
6	11570.00	46.0 AV	54.0	-8.0	2.05 V	202	29.0	17.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5642.31	61.2 PK	68.2	-7.0	1.67 H	340	56.9	4.3
2	*5825.00	124.8 PK			1.67 H	340	84.5	40.3
3	*5825.00	112.3 AV			1.67 H	340	72.0	40.3
4	#5970.51	59.8 PK	68.2	-8.4	1.67 H	340	54.9	4.9
5	11650.00	60.4 PK	74.0	-13.6	1.81 H	157	43.8	16.6
6	11650.00	46.9 AV	54.0	-7.1	1.81 H	157	30.3	16.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5608.33	58.3 PK	68.2	-9.9	1.69 V	355	54.1	4.2
2	*5825.00	123.9 PK			1.69 V	355	83.6	40.3
3	*5825.00	111.6 AV			1.69 V	355	71.3	40.3
4	#5974.36	59.3 PK	68.2	-8.9	1.69 V	355	54.3	5.0
5	11650.00	59.8 PK	74.0	-14.2	2.01 V	209	43.2	16.6
6	11650.00	46.6 AV	54.0	-7.4	2.01 V	209	30.0	16.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (HT40)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.5 PK	74.0	-8.5	2.06 H	349	55.3	10.2
2	5150.00	51.5 AV	54.0	-2.5	2.06 H	349	41.3	10.2
3	*5190.00	113.1 PK			1.66 H	345	73.8	39.3
4	*5190.00	102.5 AV			1.66 H	345	63.2	39.3
5	#10380.00	57.1 PK	68.2	-11.1	1.99 H	120	37.5	19.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.1 PK	74.0	-7.9	1.73 V	355	55.9	10.2
2	5150.00	52.2 AV	54.0	-1.8	1.73 V	355	42.0	10.2
3	*5190.00	113.5 PK			1.80 V	351	74.2	39.3
4	*5190.00	103.3 AV			1.80 V	351	64.0	39.3
5	#10380.00	57.7 PK	68.2	-10.5	1.82 V	153	38.1	19.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.0 PK	74.0	-7.0	2.09 H	349	56.8	10.2
2	5150.00	52.2 AV	54.0	-1.8	2.09 H	349	42.0	10.2
3	*5230.00	117.7 PK			1.61 H	348	78.6	39.1
4	*5230.00	107.4 AV			1.61 H	348	68.3	39.1
5	#10460.00	57.5 PK	68.2	-10.7	2.09 H	139	37.5	20.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.4 PK	74.0	-6.6	1.54 V	352	57.2	10.2
2	5150.00	52.1 AV	54.0	-1.9	1.54 V	352	41.9	10.2
3	*5230.00	117.8 PK			1.61 V	354	78.7	39.1
4	*5230.00	107.3 AV			1.61 V	354	68.2	39.1
5	#10460.00	58.1 PK	68.2	-10.1	1.79 V	144	38.1	20.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5630.77	62.5 PK	68.2	-5.7	1.51 H	343	58.3	4.2
2	*5755.00	119.9 PK			1.51 H	343	80.1	39.8
3	*5755.00	108.3 AV			1.51 H	343	68.5	39.8
4	#5932.69	59.5 PK	68.2	-8.7	1.51 H	343	54.6	4.9
5	11510.00	59.4 PK	74.0	-14.6	1.67 H	160	42.5	16.9
6	11510.00	45.9 AV	54.0	-8.1	1.67 H	160	29.0	16.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5615.38	59.5 PK	68.2	-8.7	1.69 V	354	55.3	4.2
2	*5755.00	118.4 PK			1.69 V	354	78.6	39.8
3	*5755.00	106.6 AV			1.69 V	354	66.8	39.8
4	#5948.08	59.7 PK	68.2	-8.5	1.69 V	354	54.9	4.8
5	11510.00	59.0 PK	74.0	-15.0	1.93 V	207	42.1	16.9
6	11510.00	45.5 AV	54.0	-8.5	1.93 V	207	28.6	16.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5647.44	61.9 PK	68.2	-6.3	1.56 H	339	57.6	4.3
2	*5795.00	120.7 PK			1.56 H	339	80.6	40.1
3	*5795.00	109.0 AV			1.56 H	339	68.9	40.1
4	#5966.03	59.8 PK	68.2	-8.4	1.56 H	339	55.0	4.8
5	11590.00	59.4 PK	74.0	-14.6	1.70 H	163	42.4	17.0
6	11590.00	46.9 AV	54.0	-7.1	1.70 H	163	29.9	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5635.26	59.5 PK	68.2	-8.7	1.66 V	355	55.3	4.2
2	*5795.00	120.1 PK			1.66 V	355	80.0	40.1
3	*5795.00	108.0 AV			1.66 V	355	67.9	40.1
4	#5987.82	58.4 PK	68.2	-9.8	1.66 V	355	53.4	5.0
5	11590.00	59.1 PK	74.0	-14.9	1.97 V	199	42.1	17.0
6	11590.00	46.3 AV	54.0	-7.7	1.97 V	199	29.3	17.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT80)

CHANNEL	TX Channel 42	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	72.7 PK	74.0	-1.3	2.00 H	350	62.5	10.2
2	5150.00	49.1 AV	54.0	-4.9	2.00 H	350	38.9	10.2
3	*5210.00	109.0 PK			1.91 H	347	69.8	39.2
4	*5210.00	98.4 AV			1.91 H	347	59.2	39.2
5	5350.00	60.5 PK	74.0	-13.5	1.93 H	344	50.2	10.3
6	5350.00	46.9 AV	54.0	-7.1	1.93 H	344	36.6	10.3
7	#10420.00	57.1 PK	68.2	-11.1	2.13 H	131	37.3	19.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	72.4 PK	74.0	-1.6	1.85 V	349	62.2	10.2
2	5150.00	48.4 AV	54.0	-5.6	1.85 V	349	38.2	10.2
3	*5210.00	109.1 PK			1.52 V	353	69.9	39.2
4	*5210.00	98.7 AV			1.52 V	353	59.5	39.2
5	5350.00	59.9 PK	74.0	-14.1	1.79 V	351	49.6	10.3
6	5350.00	48.9 AV	54.0	-5.1	1.79 V	351	38.6	10.3
7	#10420.00	56.5 PK	68.2	-11.7	1.77 V	144	36.7	19.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5646.79	60.0 PK	68.2	-8.2	1.51 H	340	55.7	4.3
2	#5650.00	66.8 PK	68.2	-1.4	1.55 H	350	62.5	4.3
3	*5775.00	114.4 PK			1.51 H	340	74.4	40.0
4	*5775.00	102.7 AV			1.51 H	340	62.7	40.0
5	#5925.00	64.5 PK	68.2	-3.7	1.49 H	346	59.6	4.9
6	#5946.15	60.4 PK	68.2	-7.8	1.51 H	340	55.6	4.8
7	11550.00	59.9 PK	74.0	-14.1	1.69 H	167	42.9	17.0
8	11550.00	46.7 AV	54.0	-7.3	1.69 H	167	29.7	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5610.26	59.1 PK	68.2	-9.1	1.73 V	348	54.9	4.2
2	#5650.00	64.2 PK	68.2	-4.0	1.65 V	357	59.9	4.3
3	*5775.00	113.0 PK			1.73 V	348	73.0	40.0
4	*5775.00	102.0 AV			1.73 V	348	62.0	40.0
5	#5925.00	63.0 PK	68.2	-5.2	1.71 V	351	58.1	4.9
6	#5928.85	59.5 PK	68.2	-8.7	1.73 V	348	54.6	4.9
7	11550.00	59.5 PK	74.0	-14.5	2.04 V	202	42.5	17.0
8	11550.00	46.6 AV	54.0	-7.4	2.04 V	202	29.6	17.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

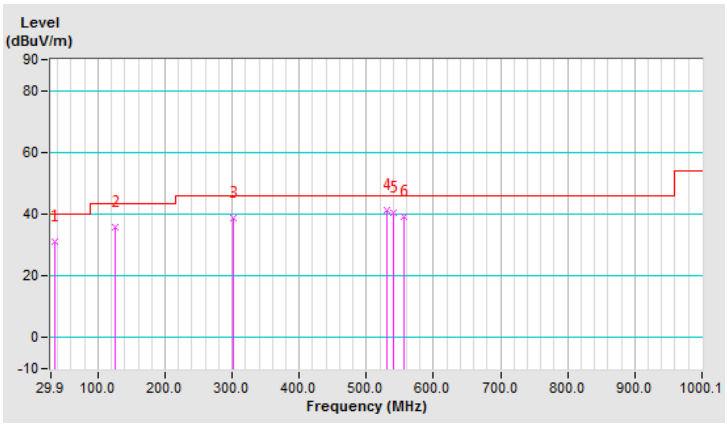
Below 1GHz worst-case data: 802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	35.73	31.3 QP	40.0	-8.7	1.01 H	19	42.0	-10.7
2	125.17	35.7 QP	43.5	-7.8	1.50 H	243	46.8	-11.1
3	302.10	38.7 QP	46.0	-7.3	1.01 H	116	46.1	-7.4
4	531.53	41.1 QP	46.0	-4.9	1.50 H	155	44.2	-3.1
5	541.25	40.3 QP	46.0	-5.7	1.50 H	181	43.2	-2.9
6	556.80	39.0 QP	46.0	-7.0	1.50 H	160	41.5	-2.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

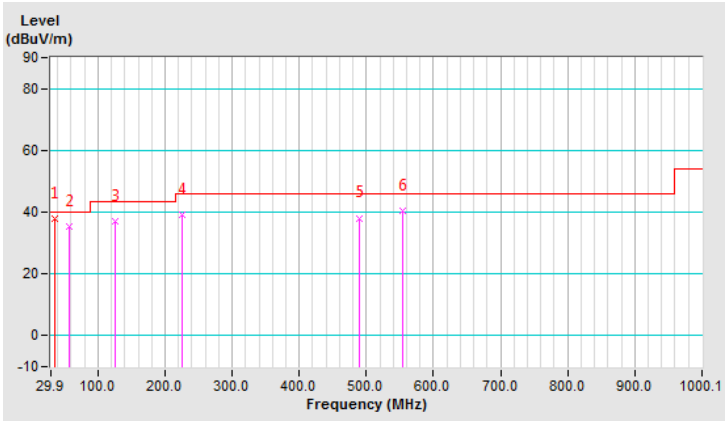


CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	35.85	37.8 QP	40.0	-2.2	1.00 V	202	48.5	-10.7
2	57.12	35.5 QP	40.0	-4.5	1.00 V	7	45.1	-9.6
3	125.17	36.9 QP	43.5	-6.6	1.50 V	14	48.0	-11.1
4	226.27	39.1 QP	46.0	-6.9	1.99 V	4	50.3	-11.2
5	488.75	38.1 QP	46.0	-7.9	1.00 V	359	41.8	-3.7
6	554.86	40.4 QP	46.0	-5.6	1.00 V	200	43.0	-2.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 26, 2018	Feb. 25, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 19, 2018	Aug. 18, 2019
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

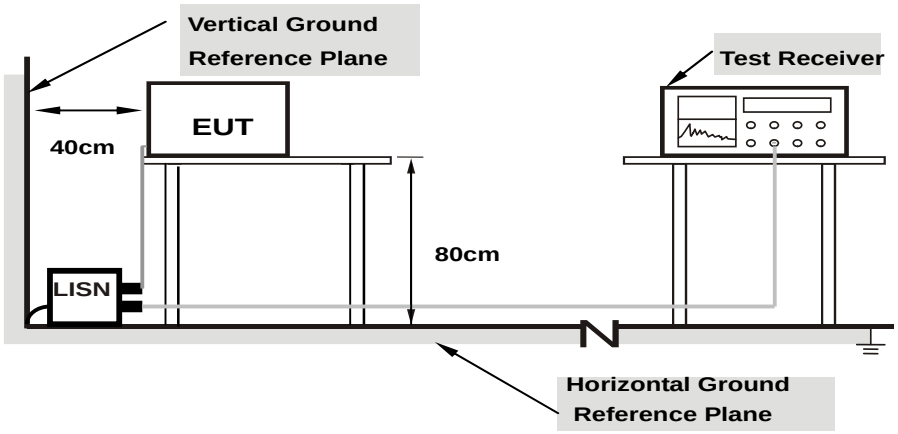
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

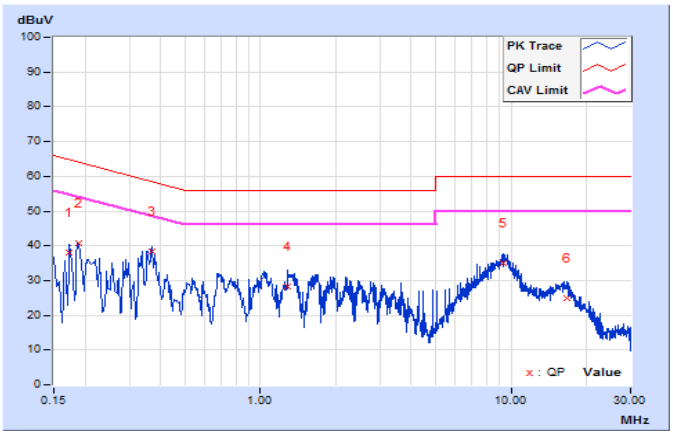
Worst-case data: 802.11a

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 149		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17346	9.67	28.54	9.66	38.21	19.33	64.79	54.79	-26.58	-35.46
2	0.18754	9.67	31.09	17.42	40.76	27.09	64.14	54.14	-23.38	-27.05
3	0.36896	9.66	28.63	18.60	38.29	28.26	58.52	48.52	-20.23	-20.26
4	1.28781	9.66	18.71	10.80	28.37	20.46	56.00	46.00	-27.63	-25.54
5	9.35805	9.84	25.10	19.54	34.94	29.38	60.00	50.00	-25.06	-20.62
6	16.79096	9.89	15.07	9.22	24.96	19.11	60.00	50.00	-35.04	-30.89

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

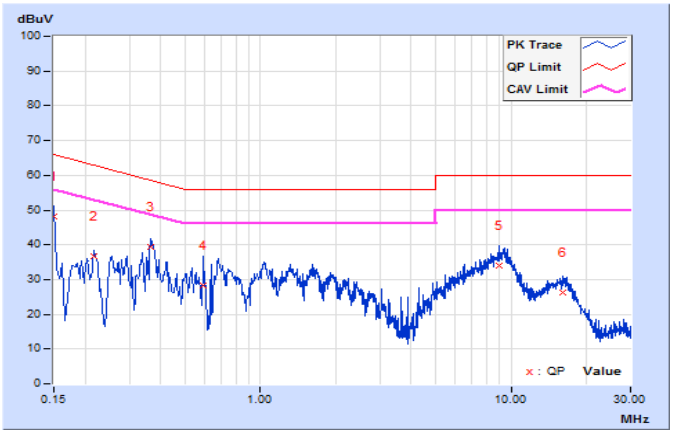


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 149		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**9.68**	**38.54**	**26.02**	**48.22**	**35.70**	**66.00**	**56.00**	**-17.78**	**-20.30**
2	0.21647	9.67	27.13	17.23	36.80	26.90	62.95	52.95	-26.15	-26.05
3	0.36526	9.67	29.59	19.32	39.26	28.99	58.61	48.61	-19.35	-19.62
4	0.59183	9.66	18.66	7.18	28.32	16.84	56.00	46.00	-27.68	-29.16
5	8.92013	9.84	24.27	18.16	34.11	28.00	60.00	50.00	-25.89	-22.00
6	16.08716	9.96	16.37	10.74	26.33	20.70	60.00	50.00	-33.67	-29.30

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1	√	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125 mW (21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Mobile and Portable client device	250 mW (24 dBm)
U-NII-2A			250 mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C			250 mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

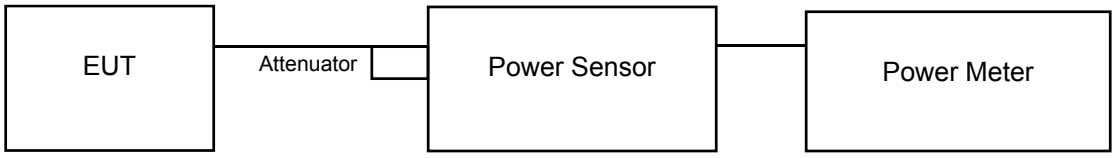
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

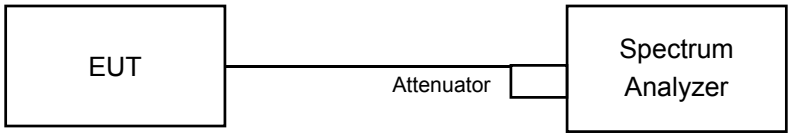
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

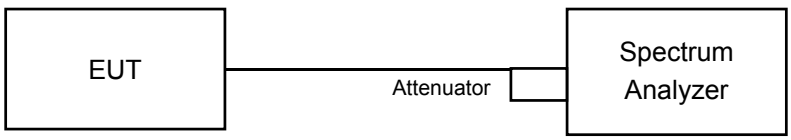
For Power Output
802.11a, 802.11n (HT20), 802.11n (HT40)



802.11ac (VHT80)



For Bandwidth



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

For 802.11a, 802.11n (HT20), 802.11n (HT40)

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

For 802.11ac (VHT80)

1) Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
2) Set sweep trigger to “free run”.
3) Set RBW = 1 MHz.
4) Set VBW ≥ 3 MHz.
5) Number of points in sweep ≥ 2 Span / RBW.
6) Sweep time ≤ (number of points in sweep) * T
7) Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
8) Detector = RMS.
9) Trace mode = max hold.
10) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
11) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

For 26dB Bandwidth

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Result

Power Output:

For U-NII-1 Band

Master Mode

802.11a

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass / Fail
		Chain 0	Chain 1							
36	5180	20.14	18.81	179.309	22.54	25.5	-1.95	20.59	21	Pass
40	5200	20.16	19.30	188.867	22.76	25.5	-1.95	20.81	21	Pass
48	5240	20.26	19.45	194.275	22.88	25.5	-1.95	20.93	21	Pass

Note:
1. Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 30-(10.5-6) = 25.5dBm.
2. Gain = -1.95dBi (above 30 degrees from the horizon)
3. EIRP = conducted power +(-1.95dBi) + array gain = (0 dB (i.e., no array gain) for NANT ≤ 4)

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass / Fail
		Chain 0	Chain 1							
36	5180	19.50	18.28	156.423	21.94	25.5	-1.95	19.99	21	Pass
40	5200	19.82	18.68	169.730	22.30	25.5	-1.95	20.35	21	Pass
48	5240	20.20	19.53	194.456	22.89	25.5	-1.95	20.94	21	Pass

Note:
1. Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 30-(10.5-6) = 25.5dBm.
2. Gain = -1.95dBi (above 30 degrees from the horizon)
3. EIRP = conducted power +(-1.95dBi) + array gain = (0 dB (i.e., no array gain) for NANT ≤ 4)

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass / Fail
		Chain 0	Chain 1							
38	5190	17.51	16.61	102.178	20.09	25.5	-1.95	18.14	21	Pass
46	5230	20.07	19.77	**196.467**	22.93	25.5	-1.95	20.98	21	Pass

Note:
1. Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 30-(10.5-6) = 25.5dBm.
2. Gain = -1.95dBi (above 30 degrees from the horizon)
3. EIRP = conducted power +(-1.95dBi) + array gain = (0 dB (i.e., no array gain) for NANT ≤ 4)

802.11ac (VHT80)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Pass / Fail
		Chain 0	Chain 1							
42	5210	16.55	15.67	82.084	19.14	25.5	-1.95	17.19	21	Pass

Note:
1. Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 30-(10.5-6) = 25.5dBm.
2. Gain = -1.95dBi (above 30 degrees from the horizon)
3. EIRP = conducted power +(-1.95dBi) + array gain = (0 dB (i.e., no array gain) for NANT ≤ 4)

Client Mode

802.11a

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	14.41	13.06	47.836	16.80	19.5	Pass
40	5200	14.45	13.12	48.373	16.85	19.5	Pass
48	5240	13.74	12.87	43.023	16.34	19.5	Pass

Note: Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 24-(10.5-6) = 19.5dBm.

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	14.75	13.65	53.028	17.25	19.5	Pass
40	5200	14.79	13.69	53.518	17.28	19.5	Pass
48	5240	13.74	12.96	43.429	16.38	19.5	Pass

Note: Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 24-(10.5-6) = 19.5dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	16.55	15.61	81.578	19.12	19.5	Pass
46	5230	16.33	15.83	81.236	19.10	19.5	Pass

Note: Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 24-(10.5-6) = 19.5dBm.

802.11ac (VHT80)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	16.55	15.67	**82.084**	19.14	19.5	Pass

Note: Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 24-(10.5-6) = 19.5dBm.

For U-NII-3 Band

802.11a

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	22.25	22.57	**348.597**	25.42	25.5	Pass
157	5785	21.95	22.57	337.392	25.28	25.5	Pass
165	5825	22.10	22.58	343.315	25.36	25.5	Pass

Note: Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 30-(10.5-6) = 25.5dBm.

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	22.07	22.31	331.281	25.20	25.5	Pass
157	5785	21.83	22.47	329.009	25.17	25.5	Pass
165	5825	22.09	22.53	340.869	25.33	25.5	Pass

Note: Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 30-(10.5-6) = 25.5dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	21.95	22.11	319.230	25.04	25.5	Pass
159	5795	21.78	22.26	318.928	25.04	25.5	Pass

Note: Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 30-(10.5-6) = 25.5dBm.

802.11ac (VHT80)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	18.21	18.51	137.180	21.37	25.5	Pass

Note: Max. Gain = 10.5dBi > 6dBi, so the limit shall be reduced to 30-(10.5-6) = 25.5dBm.

26dB Bandwidth:

Master Mode

802.11a

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	19.47	19.24
40	5200	19.50	19.25
48	5240	19.50	19.19

802.11n (HT20)

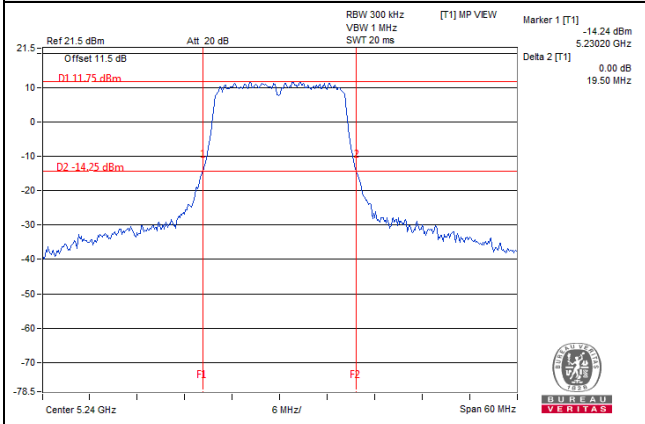
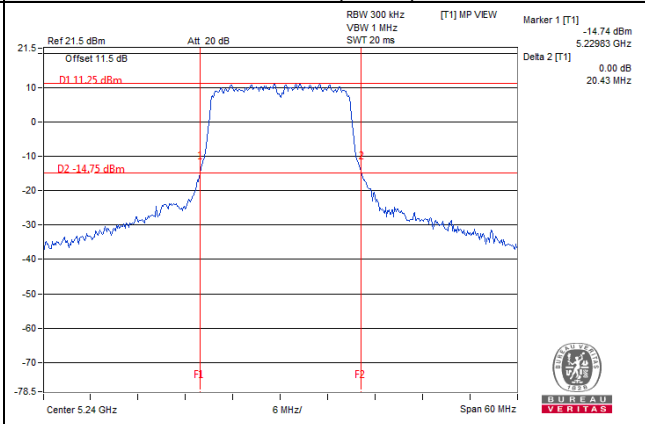
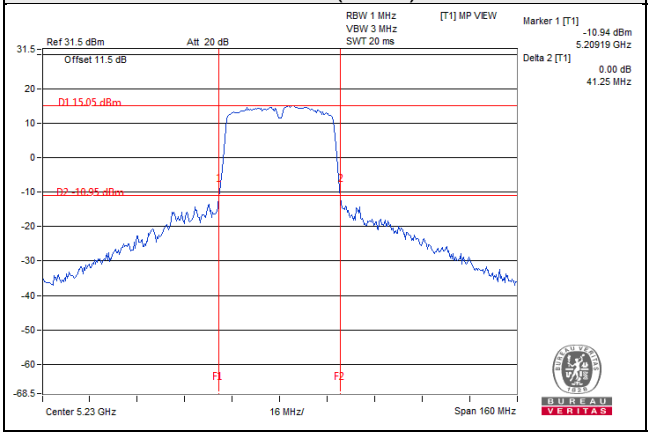
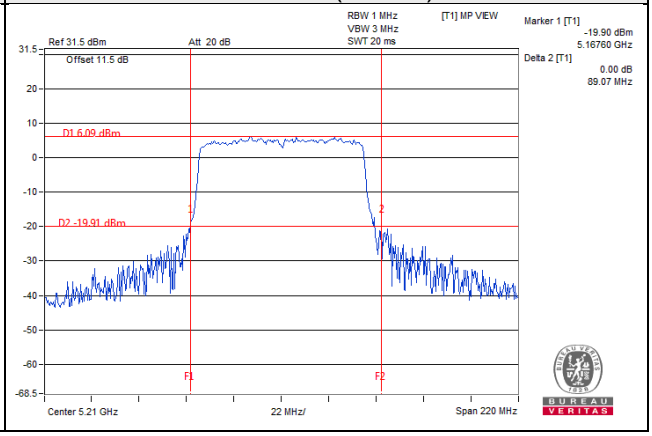
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	20.31	20.32
40	5200	20.30	20.35
48	5240	20.38	20.43

802.11n (HT40)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	40.71	40.64
46	5230	40.85	41.25

802.11ac (VHT80)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	87.03	89.07

Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

Client Mode

802.11a

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	19.57	19.27
40	5200	19.68	19.25
48	5240	19.45	19.22

802.11n (HT20)

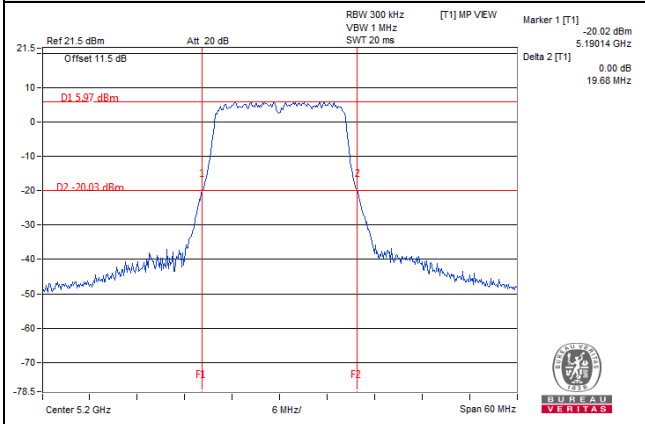
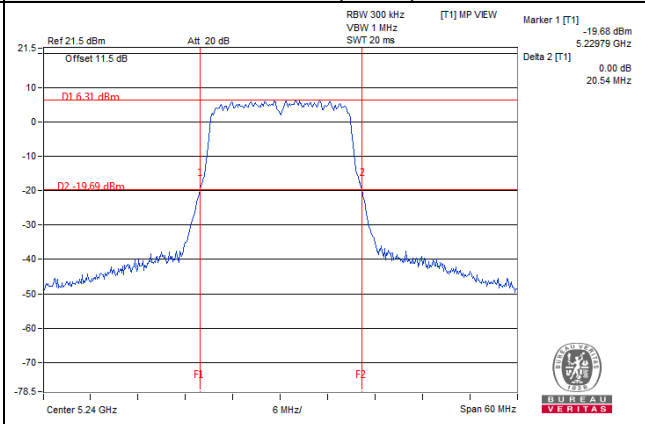
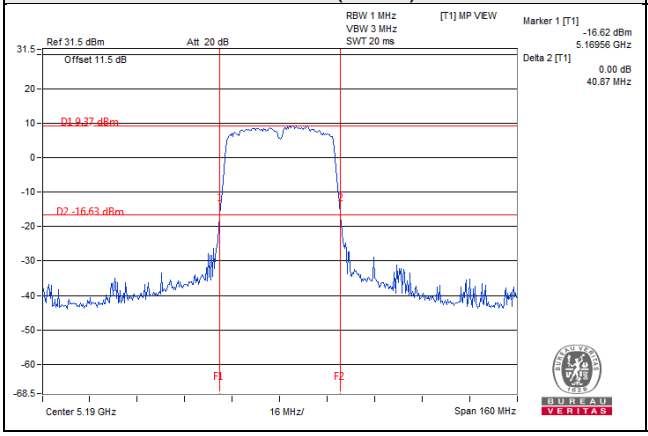
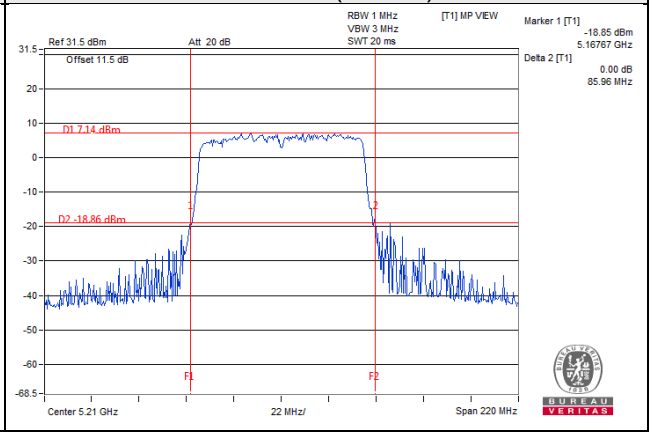
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	20.37	20.50
40	5200	20.27	20.52
48	5240	20.44	20.54

802.11n (HT40)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	40.80	40.87
46	5230	40.79	40.76

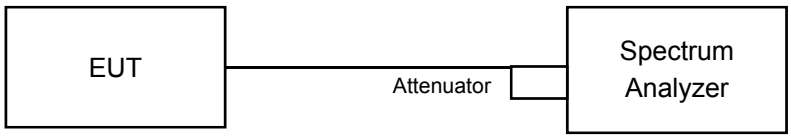
802.11ac (VHT80)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	85.96	84.67

Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.4.4 Test Result

For U-NII-1 band

Master Mode

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.44	16.44
40	5200	16.44	16.44
48	5240	16.44	16.44

802.11n (HT20)

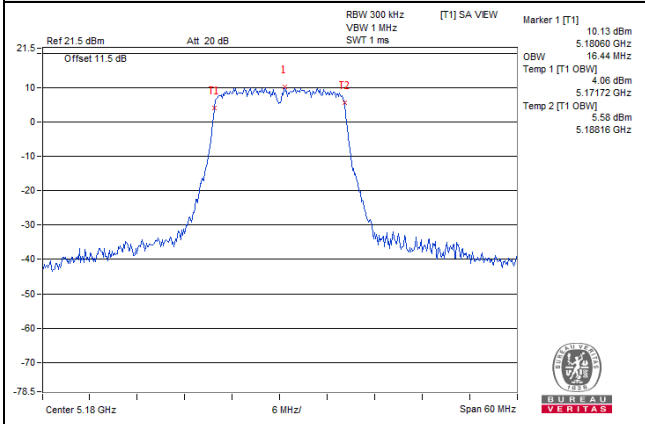
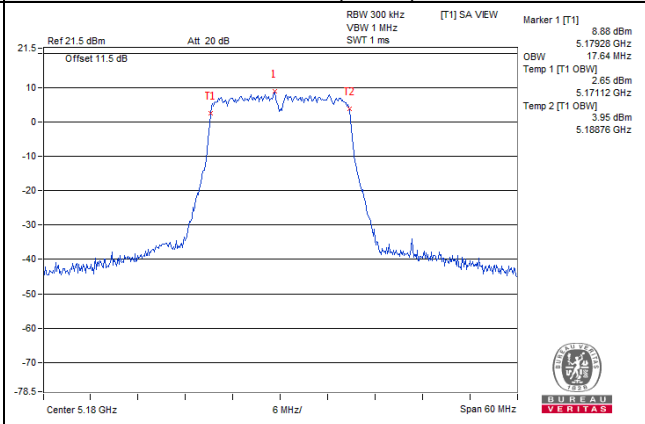
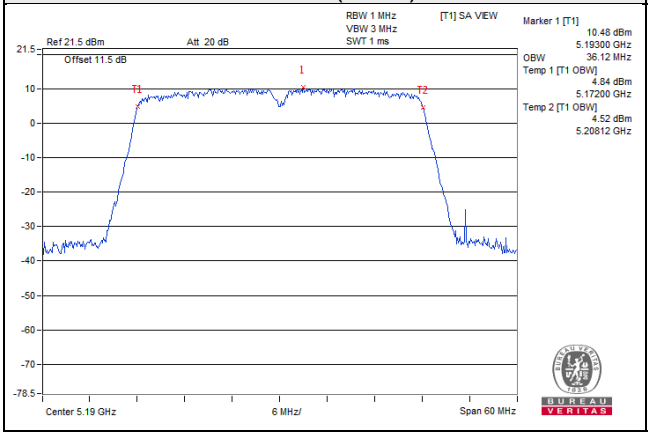
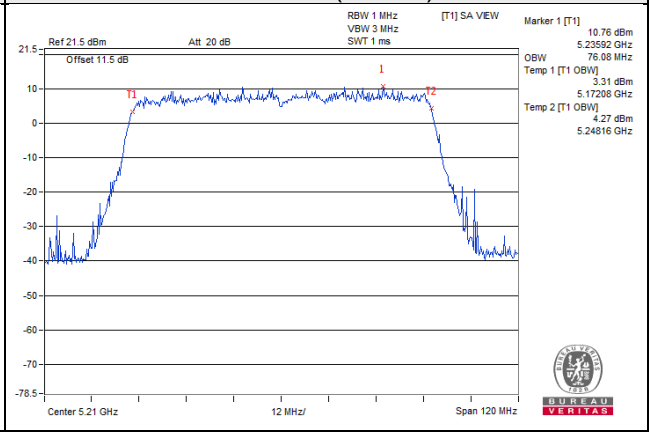
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.64
40	5200	17.64	17.64
48	5240	17.64	17.64

802.11n (HT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.12	36.00
46	5230	36.12	36.00

802.11ac (VHT80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	76.08	75.84

Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

Client Mode

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.44	16.44
40	5200	16.56	16.56
48	5240	16.44	16.44

802.11n (HT20)

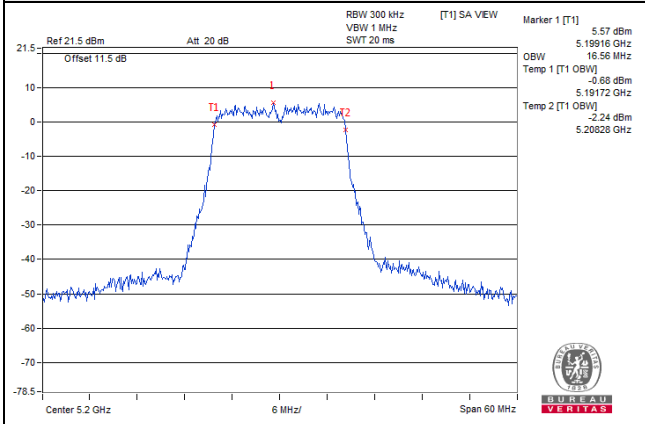
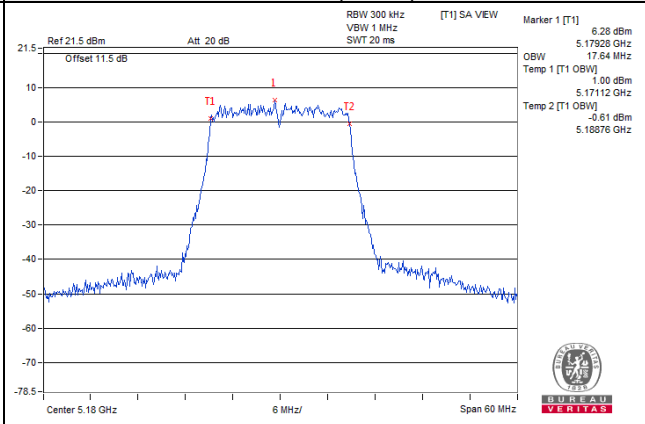
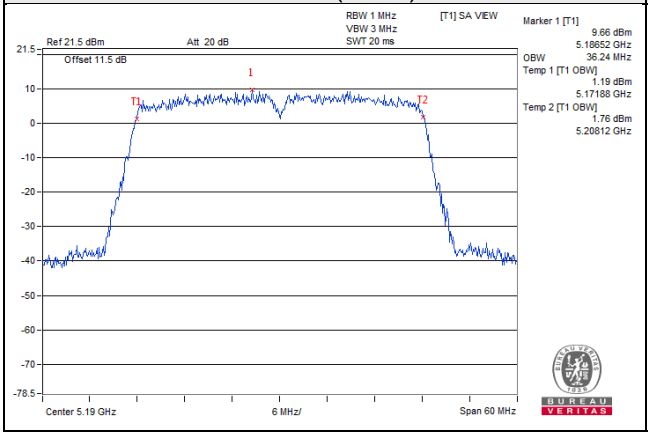
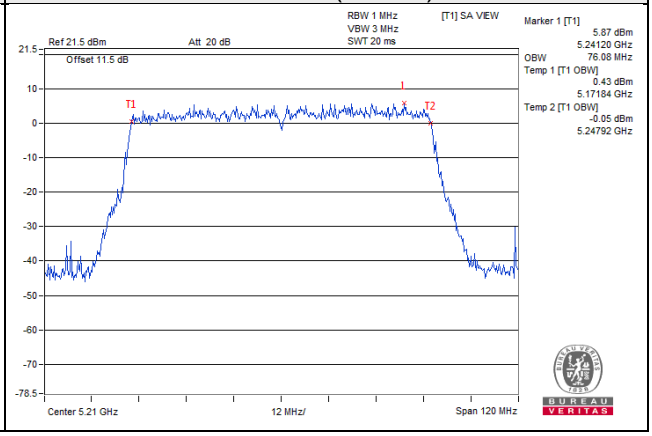
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.64
40	5200	17.64	17.64
48	5240	17.64	17.64

802.11n (HT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.24	36.12
46	5230	36.12	36.12

802.11ac (VHT80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	76.08	75.84

Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

For U-NII-3 band

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	16.56	16.44
157	5785	16.56	16.44
165	5825	16.44	16.44

802.11n (HT20)

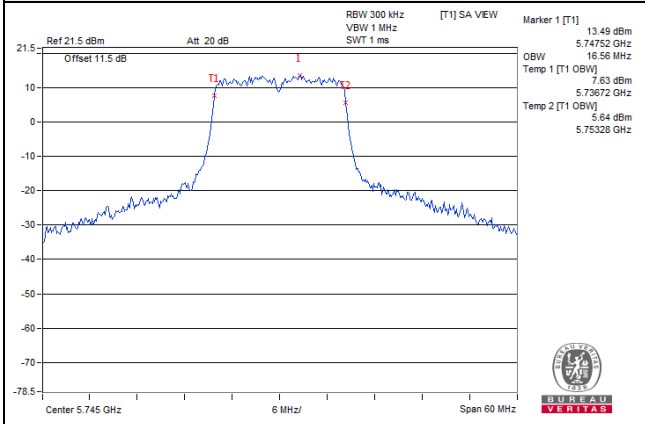
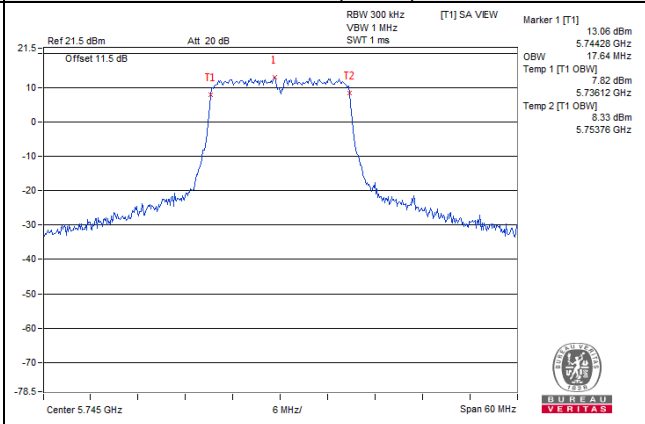
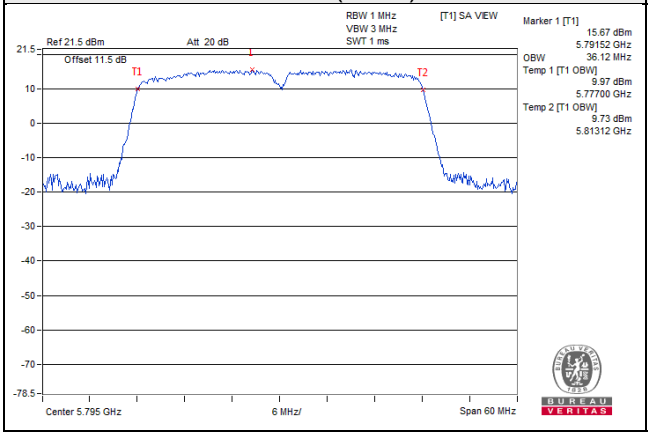
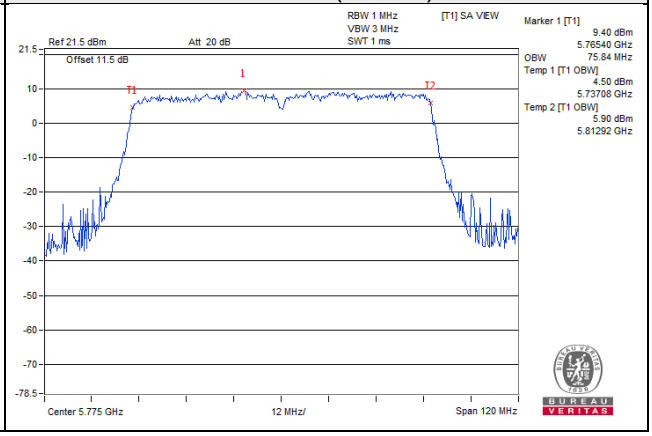
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	17.64	17.64
157	5785	17.64	17.64
165	5825	17.64	17.64

802.11n (HT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
151	5755	36.00	36.00
159	5795	36.12	36.00

802.11ac (VHT80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
155	5775	75.84	75.84

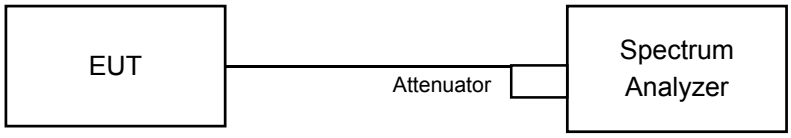
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1	√	Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Mobile and Portable client device	
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

For U-NII-1, U-NII-2A, U-NII-2C Band

Duty cycle of test signal is ≥ 98%
Using method SA-1
1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS.
3) Set Channel power measure = 1MHz.
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value.

Duty cycle of test signal is < 98%
Using method SA-2
1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS.
3) Set Channel power measure = 1MHz.
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value and add 10 log (1/duty cycle).

For U-NII-3 Band

Duty cycle of test signal is ≥ 98%
Using method SA-1
1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS.
3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured 1) power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz / 300 kHz).
5) Sweep time = auto, trigger set to “free run”.
6) Trace average at least 100 traces in power averaging mode.
7) Record the max value.

Duty cycle of test signal is < 98%
1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS.
3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz / 300 kHz).
5) Sweep time = auto, trigger set to “free run”.
6) Trace average at least 100 traces in power averaging mode.
7) Record the max value and add 10 log (1/duty cycle).

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as 4.3.6.

4.5.7 Test Results

For U-NII-1 Band

Master Mode

802.11a

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	5.87	4.85	0.23	8.63	9.49	Pass
40	5200	6.41	5.73	0.23	9.32	9.49	Pass
48	5240	6.33	5.83	0.23	9.33	9.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 17-(13.51-6) = 9.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	4.13	3.08	0.10	6.75	9.49	Pass
40	5200	6.68	5.81	0.10	9.38	9.49	Pass
48	5240	6.55	6.06	0.10	9.42	9.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 17-(13.51-6) = 9.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	0.58	-0.27	0.22	3.41	9.49	Pass
46	5230	4.39	4.00	0.22	7.43	9.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 17-(13.51-6) = 9.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

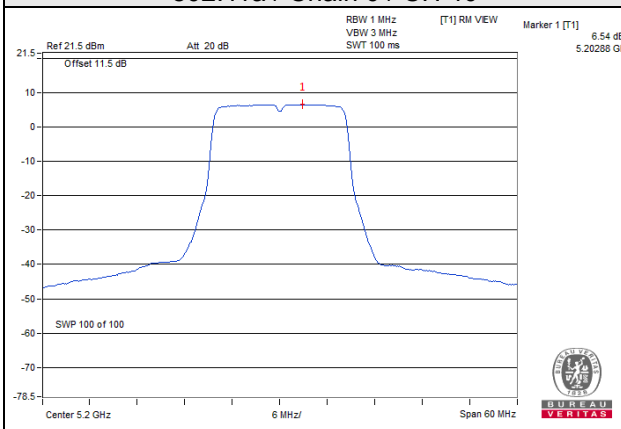
802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-4.09	-4.85	0.31	-1.13	9.49	Pass

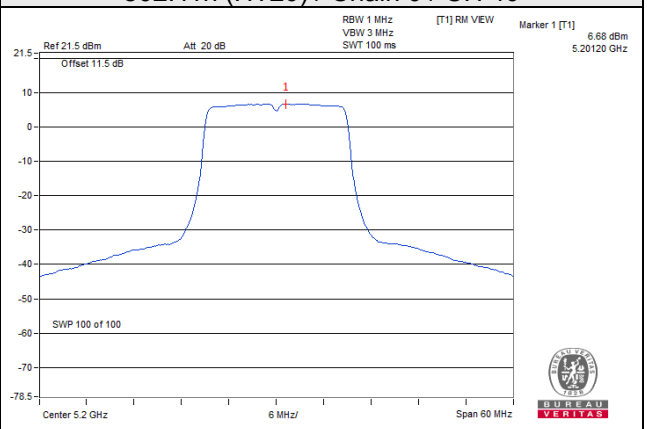
Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 17-(13.51-6) = 9.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

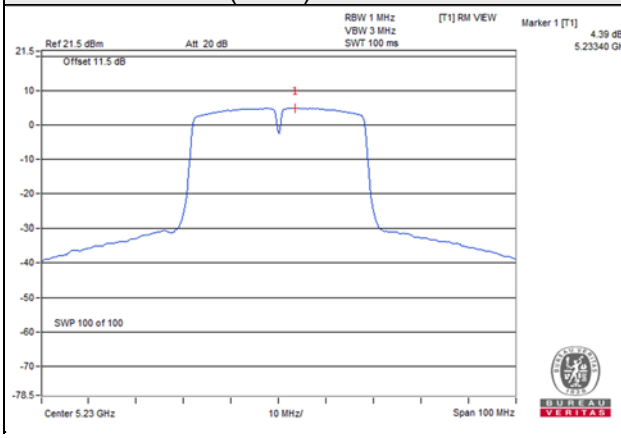
802.11a / Chain 0 / CH 40



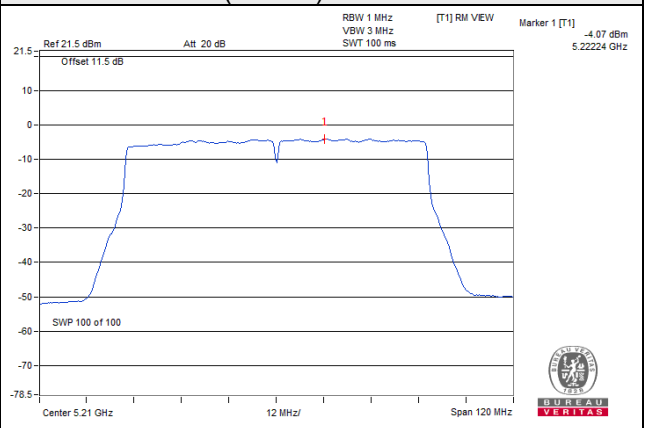
802.11n (HT20) / Chain 0 / CH 40



802.11n (HT40) / Chain 0 / CH 46



802.11ac (VHT80) / Chain 0 / CH 42



Client Mode

802.11a

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	0.45	-0.60	0.23	3.20	9.49	Pass
40	5200	0.63	-0.30	0.23	3.43	9.49	Pass
48	5240	0.41	0.06	0.23	3.48	9.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 17-(13.51-6) = 9.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	0.69	-0.28	0.10	3.34	9.49	Pass
40	5200	0.50	0.07	0.10	3.40	9.49	Pass
48	5240	0.24	-0.11	0.10	3.18	9.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 17-(13.51-6) = 9.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-0.80	-1.68	0.22	2.01	9.49	Pass
46	5230	-0.66	-1.22	0.22	2.30	9.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 17-(13.51-6) = 9.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

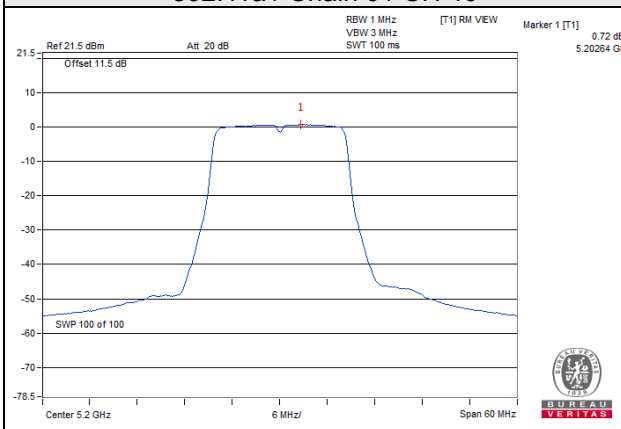
802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-4.56	-4.98	0.31	-1.44	9.49	Pass

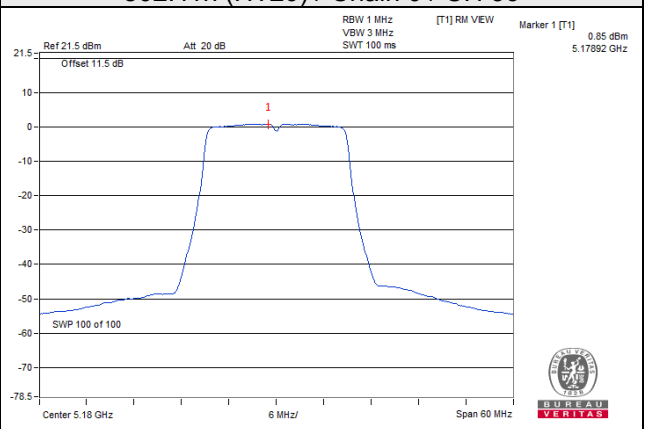
Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 17-(13.51-6) = 9.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

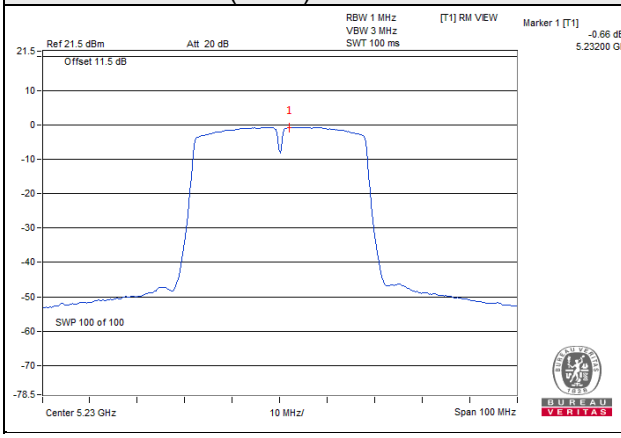
802.11a / Chain 0 / CH 40



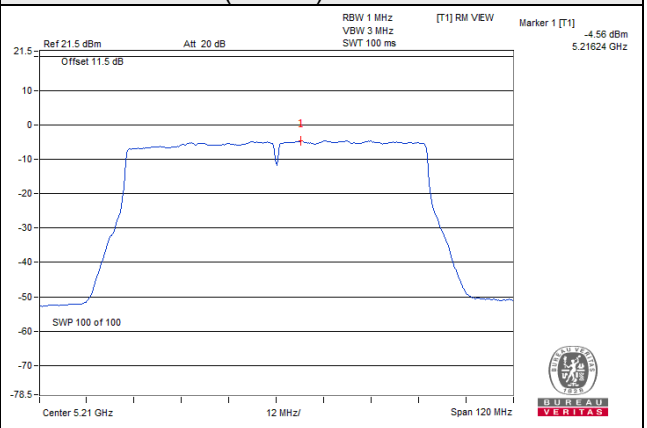
802.11n (HT20) / Chain 0 / CH 36



802.11n (HT40) / Chain 0 / CH 46



802.11ac (VHT80) / Chain 0 / CH 42



For U-NII-3 Band

802.11a

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	1.00	3.22	3.01	0.23	6.46	22.49	Pass
	157	5785	1.20	3.42	3.01	0.23	6.66	22.49	Pass
	165	5825	0.80	3.02	3.01	0.23	6.26	22.49	Pass
1	149	5745	1.05	3.27	3.01	0.23	6.51	22.49	Pass
	157	5785	1.17	3.39	3.01	0.23	6.63	22.49	Pass
	165	5825	1.25	3.47	3.01	0.23	6.71	22.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 30-(13.51-6) = 22.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	0.53	2.75	3.01	0.10	5.86	22.49	Pass
	157	5785	-0.10	2.12	3.01	0.10	5.23	22.49	Pass
	165	5825	0.70	2.92	3.01	0.10	6.03	22.49	Pass
1	149	5745	0.87	3.09	3.01	0.10	6.20	22.49	Pass
	157	5785	1.00	3.22	3.01	0.10	6.33	22.49	Pass
	165	5825	1.05	3.27	3.01	0.10	6.38	22.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 30-(13.51-6) = 22.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

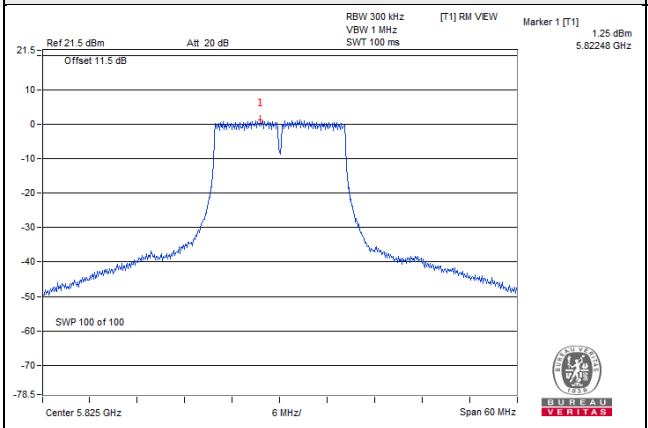
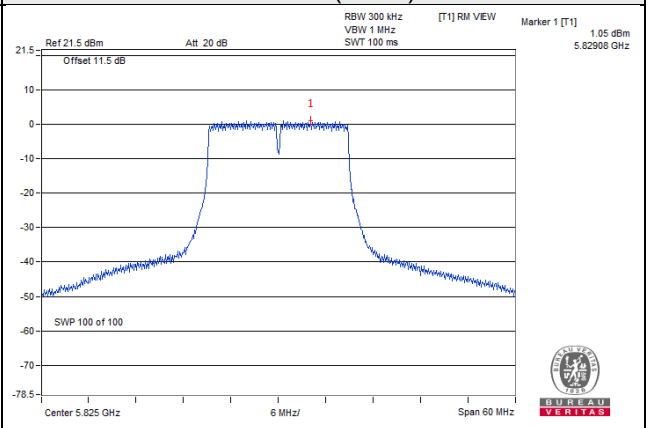
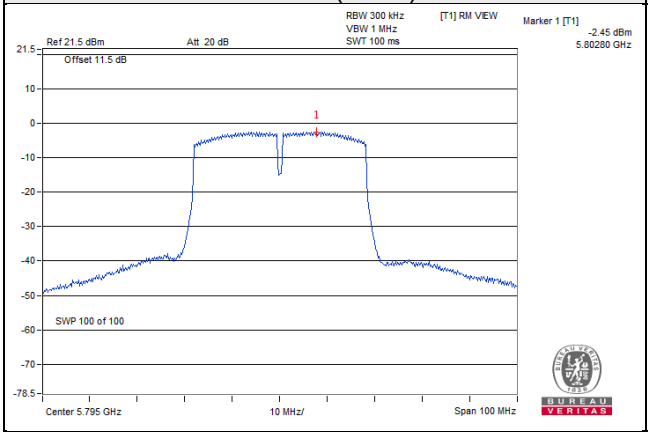
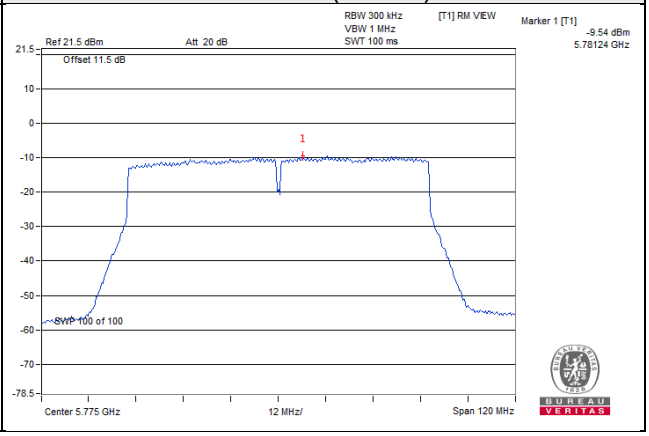
TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-2.78	-0.56	3.01	0.22	2.67	22.49	Pass
	159	5795	-2.90	-0.68	3.01	0.22	2.55	22.49	Pass
1	151	5755	-2.70	-0.48	3.01	0.22	2.75	22.49	Pass
	159	5795	-2.45	-0.23	3.01	0.22	3.00	22.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 30-(13.51-6) = 22.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-9.62	-7.40	3.01	0.31	-4.08	22.49	Pass
1	155	5775	-9.54	-7.32	3.01	0.31	-4.00	22.49	Pass

Note:
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 10.5dBi + 10log(2) = 13.51dBi > 6dBi, so the limit shall be reduced to 30-(13.51-6) = 22.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

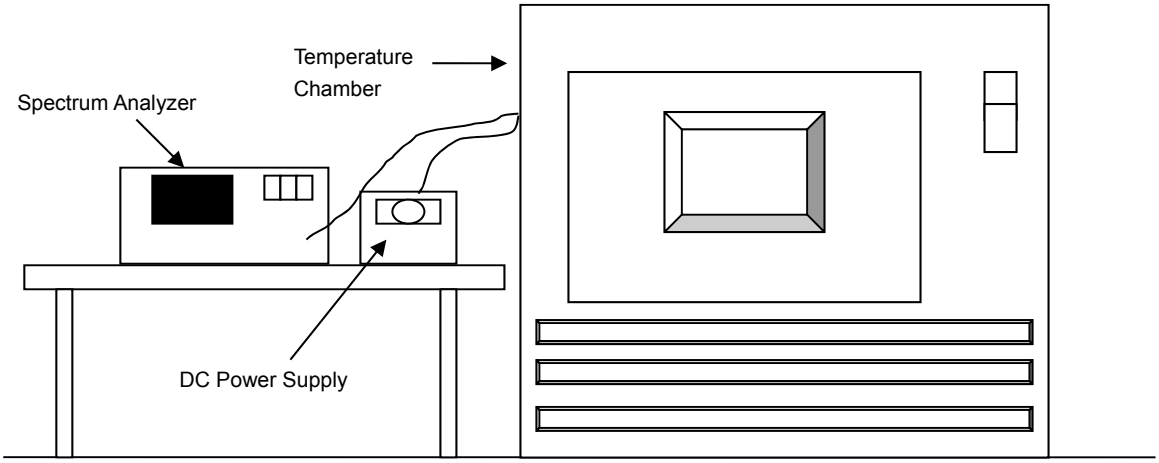
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.6 Frequency Stability

4.6.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.6.2 Test Setup



4.6.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 25, 2018	Sep. 24, 2019
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 04, 2018	Jun. 03, 2019
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019
DC Power Supply Topward	6603D	700637	NA	NA

4.6.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.6.7 Test Results

Master Mode

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	48	5179.9816	PASS	5179.983	PASS	5179.9825	PASS	5179.9816	PASS
40	48	5180.0059	PASS	5180.0028	PASS	5180.0054	PASS	5180.0022	PASS
30	48	5179.9979	PASS	5179.9942	PASS	5179.9958	PASS	5179.9946	PASS
20	48	5179.9869	PASS	5179.986	PASS	5179.9878	PASS	5179.9876	PASS
10	48	5180.0037	PASS	5180.0061	PASS	5180.0057	PASS	5180.0011	PASS
0	48	5179.9741	PASS	5179.9758	PASS	5179.9763	PASS	5179.9735	PASS
-10	48	5180.0085	PASS	5180.0069	PASS	5180.0093	PASS	5180.0097	PASS
-20	48	5179.9954	PASS	5179.9997	PASS	5179.9998	PASS	5179.9993	PASS
-30	48	5180.0172	PASS	5180.0172	PASS	5180.0185	PASS	5180.0195	PASS

Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	55.2	5179.986	PASS	5179.9869	PASS	5179.9871	PASS	5179.9879	PASS
	48	5179.9869	PASS	5179.986	PASS	5179.9878	PASS	5179.9876	PASS
	40.8	5179.9868	PASS	5179.9858	PASS	5179.9883	PASS	5179.9877	PASS

Client Mode

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	48	5179.9823	PASS	5179.9832	PASS	5179.9839	PASS	5179.9853	PASS
40	48	5180.0063	PASS	5180.01	PASS	5180.0085	PASS	5180.0098	PASS
30	48	5179.9833	PASS	5179.9819	PASS	5179.984	PASS	5179.9849	PASS
20	48	5179.9895	PASS	5179.9868	PASS	5179.9874	PASS	5179.9903	PASS
10	48	5180.0226	PASS	5180.0251	PASS	5180.0239	PASS	5180.0225	PASS
0	48	5180.0146	PASS	5180.0127	PASS	5180.0147	PASS	5180.0147	PASS
-10	48	5180.0018	PASS	5180.0015	PASS	5179.9975	PASS	5180	PASS
-20	48	5179.9764	PASS	5179.9757	PASS	5179.9737	PASS	5179.9739	PASS
-30	48	5179.9799	PASS	5179.9819	PASS	5179.982	PASS	5179.9824	PASS

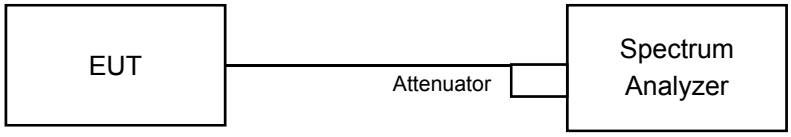
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	55.2	5179.9889	PASS	5179.9876	PASS	5179.9864	PASS	5179.991	PASS
	48	5179.9895	PASS	5179.9868	PASS	5179.9874	PASS	5179.9903	PASS
	40.8	5179.9887	PASS	5179.9871	PASS	5179.9873	PASS	5179.99	PASS

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

Measurement Procedure REF

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.7.7 Test Results

802.11a

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.42	16.43	0.5	Pass
157	5785	16.41	16.44	0.5	Pass
165	5825	16.40	16.43	0.5	Pass

802.11n (HT20)

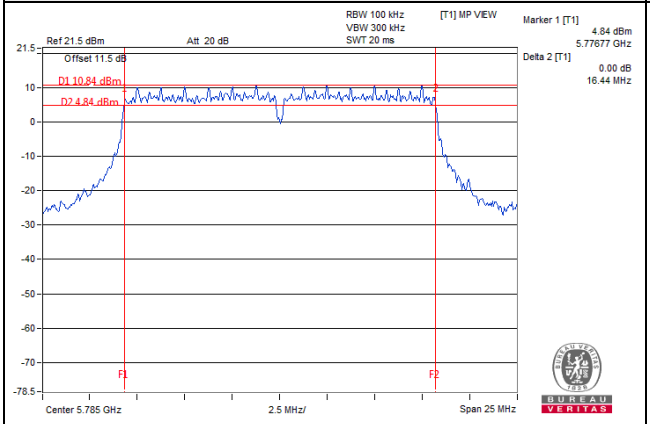
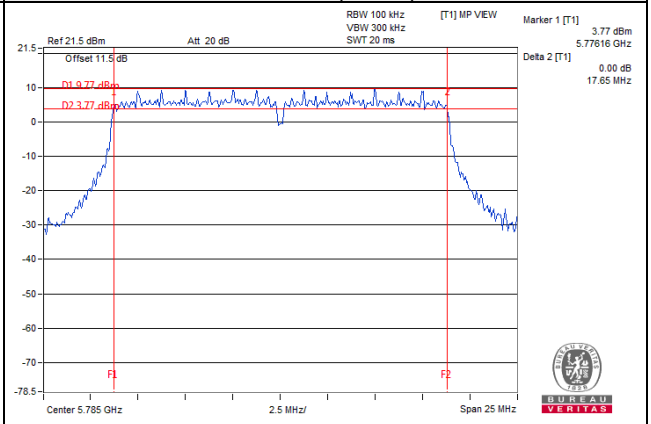
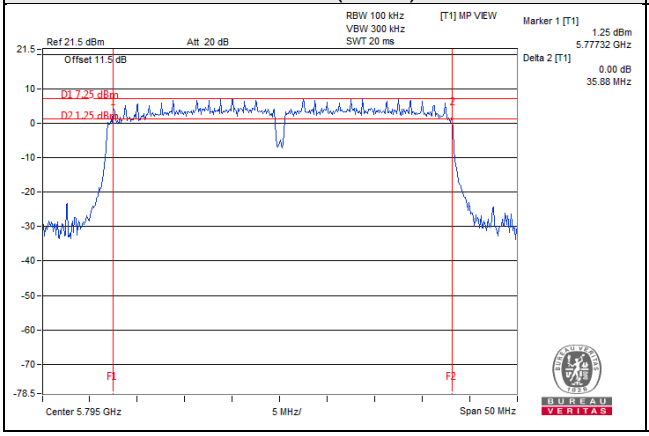
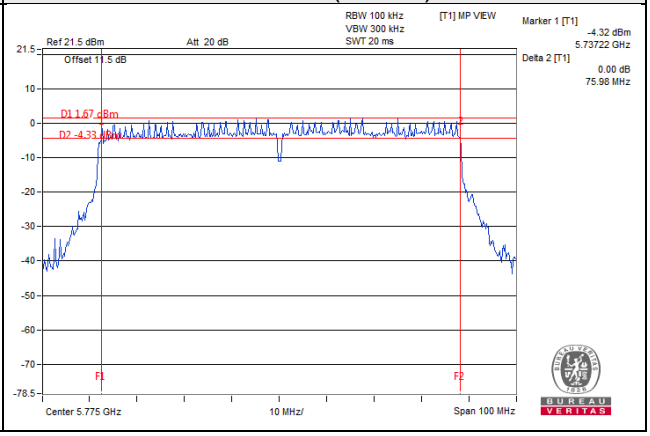
Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.63	17.64	0.5	Pass
157	5785	17.65	17.64	0.5	Pass
165	5825	17.64	17.65	0.5	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.30	35.32	0.5	Pass
159	5795	35.88	35.32	0.5	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.98	75.49	0.5	Pass

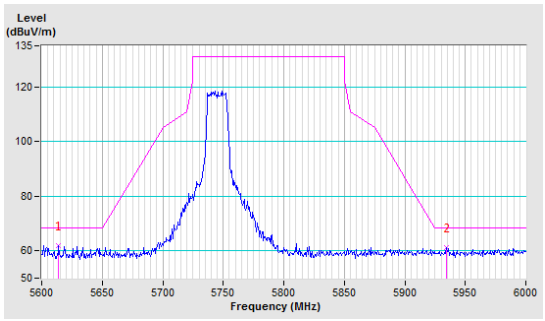
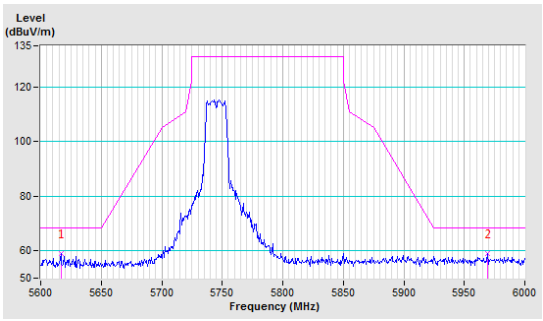
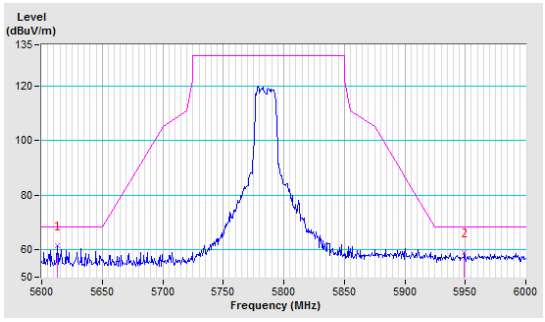
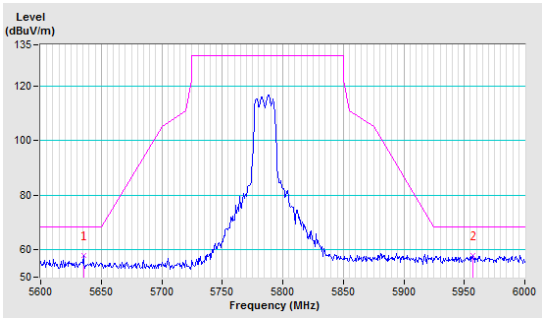
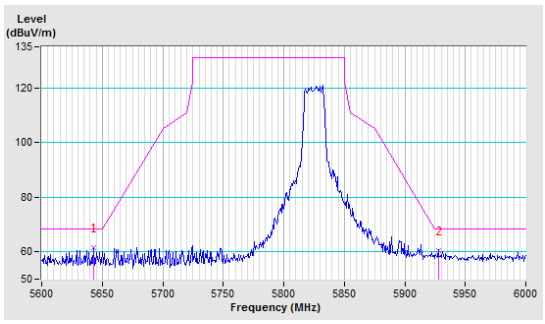
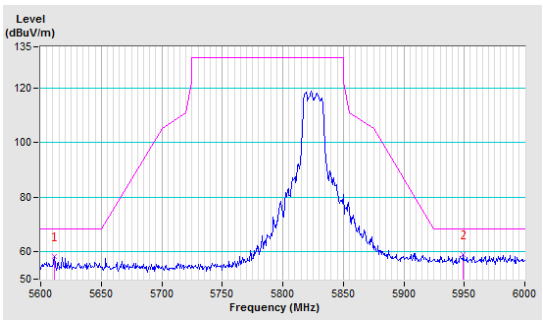
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

5 Pictures of Test Arrangements

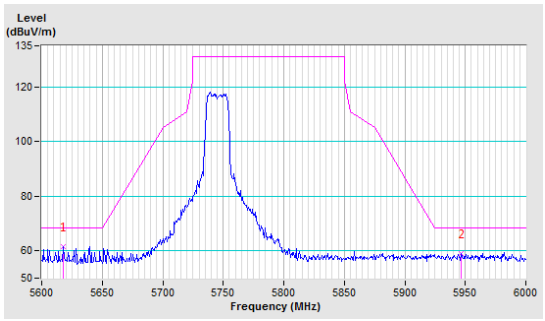
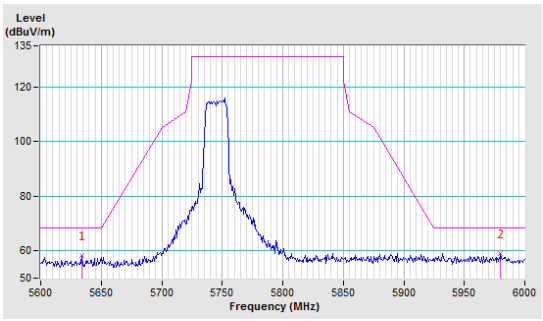
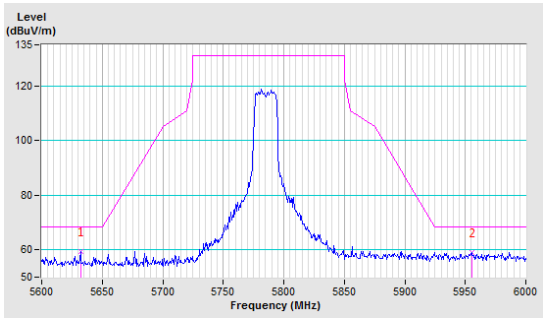
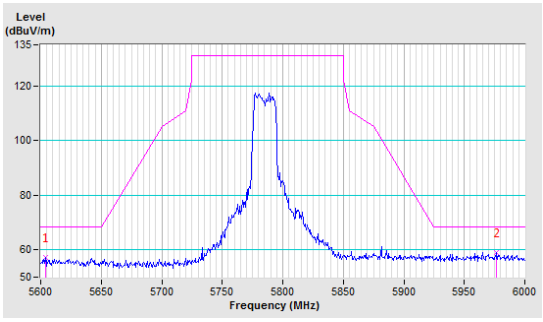
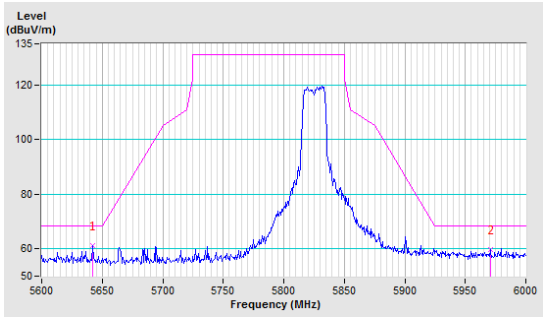
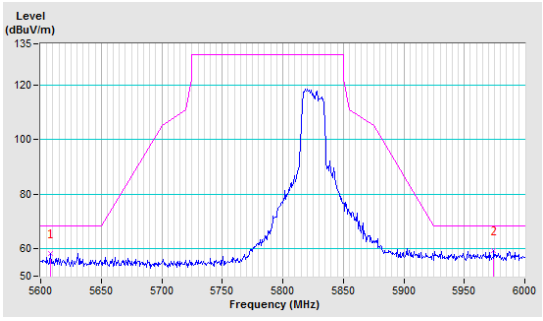
Please refer to the attached file (Test Setup Photo).

Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 Band)

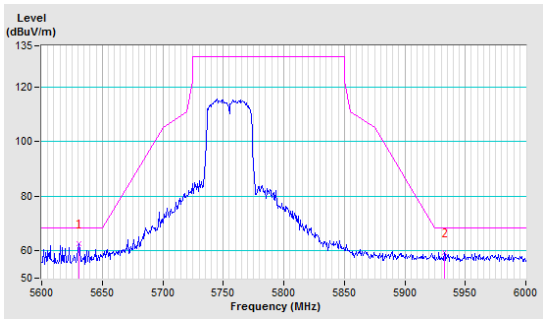
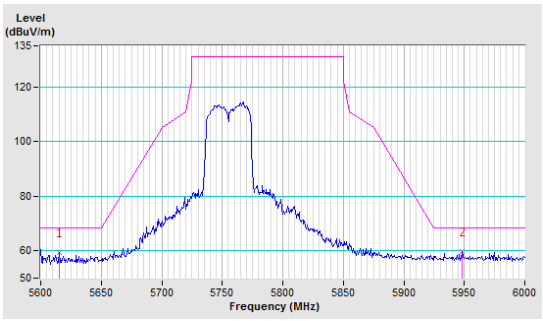
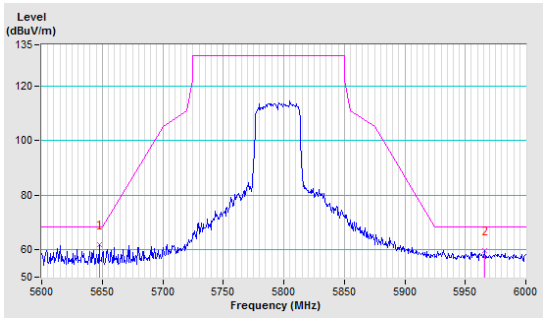
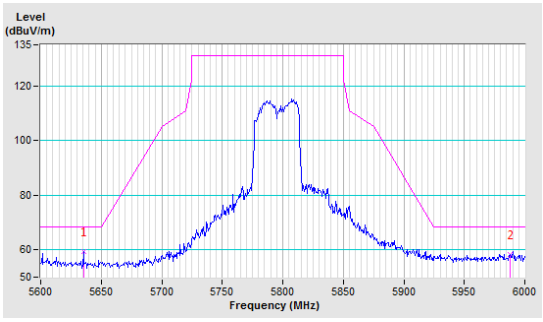
802.11a

CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

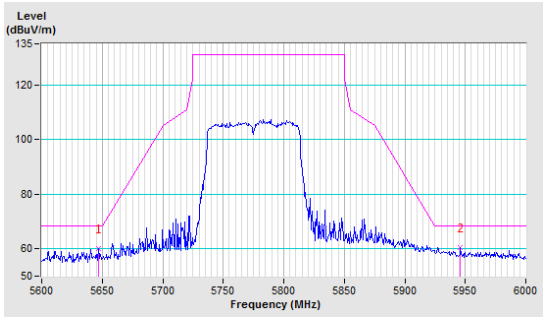
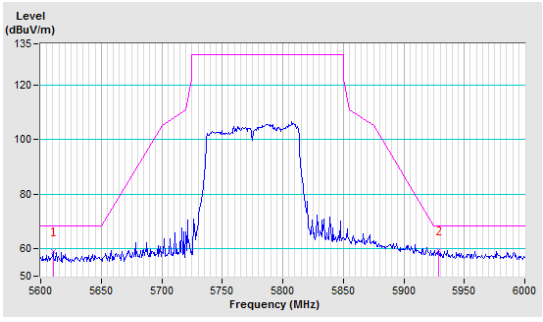
802.11n (HT20)

CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

802.11n (HT40)

CH151	
Horizontal	Vertical
	
CH159	
Horizontal	Vertical
	

802.11ac (VHT80)

CH155	
Horizontal	Vertical
	

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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